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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/827,449

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EXAMINER

STAHL, MICHAEL J

ART UNIT

PAPER NUMBER

2874

DATE MAILED: 02/16/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/827,449

Applicant(s)

TANAKA ET AL.

Examiner

Mike Stahl

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-48 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-8, 13-22 and 29-48 is/are rejected.
- 7) ☒ Claim(s) 1, 5, 9-13, 17, 23-29, 37, 43 and 45 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 20 April 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 7/25/05, 4/20/04.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: ____.

Claim Objections

Claims 1, 5, 9, 13, 23, 29, 37, and 43 are objected to because in each of the following instances, “liner” should be changed to “linear”:

- Claim 1 lines 3 and 6
- Claim 5 lines 3 and 9
- Claim 9 lines 8, 9, and 10
- Claim 13 lines 6, 7, and 8
- Claim 23 lines 10, 11, and 12
- Claim 29 lines 9 and 11
- Claim 37 lines 6, 8, and 10
- Claim 43 lines 6, 8, and 10

Claim 5 is also objected to because in line 7 “the irradiated” should be changed to “an irradiated”.

Claim 13 is also objected to because in line 10, “waveguides” should be changed to “waveguide”.

Claim 29 is also objected to because in line 10, “line” should be changed to “linear”.

Claim 17 is objected to because in line 5, “shape” or “beam spot” should be inserted after “rectangular”.

Claim 23 is further objected to because its preamble recites “a laser oscillator comprising:”, but all of its dependent claims recite “a laser irradiation apparatus according to claim 23”. Also note that in its current form claim 23 approaches a circular definition since the

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body of the claim also refers to “a laser oscillator”. Therefore it is suggested that the preamble of claim 23 be amended to recite “A laser irradiation apparatus comprising:”.

Claim 45 is objected to because the phrase “through 20” should be deleted.

Specification

The specification is objected to per 37 CFR 1.75(d)(1) and MPEP § 608.01(o) as failing to provide proper antecedent basis for claim 43. It is not clear where the specification describes a single optical waveguide operating on both the major and minor axes of the beam spot. Applicant is required to either point out where the specification supports claim 43, amend the specification to provide such support without introducing new matter, or amend claim 43 to be consistent with the original specification.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 5, 13, 17, 19, 29, 31, 43, and 45 are rejected under 35 U.S.C. 102(b) as being anticipated by Obara (JP 8-338962, cited in April 20 2004 information disclosure statement).

Claim 1: Obara discloses a beam homogenizer comprising: an optical system for homogenizing energy distribution of a linear-shaped beam spot in one direction, the optical

system comprising: an optical waveguide including a pair 3 of reflection planes provided oppositely; wherein the one direction is a direction of a major axis of the linear shape, and wherein a laser beam is incident into one edge portion of the optical waveguide and emitted from the other edge portion of the optical waveguide. See fig. 1 and [0013]-[0014] of the translation.

Claim 5: In addition to the repeated limitations from claim 1, the Obara device further includes at least one cylindrical lens 5 for expanding and projecting a plane having homogeneous energy distribution formed by the optical waveguide to an irradiated surface (rightmost object in fig. 1, which is an amorphous silicon target according to [0015]).

Claim 13: Obara describes the recited homogenizer at [0008] under “third aspect”. Also see fig. 1 which shows mutually perpendicular first mirror pair 3 and second mirror pair 4.

Claims 17 and 29: Fig. 1 of Obara shows the recited laser irradiation apparatus. The laser oscillator is not illustrated but is described at [0014] lines 4-6.

Claims 19 and 31: The laser oscillator is an excimer laser.

Claim 43: Obara describes the recited method at [0014]-[0015].

Claim 45: The laser oscillator is an excimer laser.

Claims 1-2, 5-6, and 17-18 are rejected under 35 U.S.C. 102(b) as being anticipated by Pflibsen et al. (US 5303084).

Claim 1: Pflibsen discloses a beam homogenizer comprising: an optical system for homogenizing energy distribution of a linear-shaped beam spot in one direction, the optical system comprising: an optical waveguide 16 including a pair of reflection planes provided oppositely; wherein the one direction is a direction of a major axis of the linear shape, and

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wherein a laser beam is incident into one edge portion of the optical waveguide and emitted from the other edge portion of the optical waveguide. See fig. 1.

Claim 2: The optical waveguide 16 is a light pipe (col. 6 lns. 15-18).

Claim 5: In addition to the repeated limitations from claim 1, the Pflibsen device further includes at least one cylindrical lens 36 for expanding and projecting a plane having homogeneous energy distribution formed by the optical waveguide to an irradiated surface. See fig. 2.

Claim 6: See above with regard to claim 2.

Claim 17: The Pflibsen device includes all the recited elements. The laser oscillator is not shown but is mentioned at col. 3 lns. 26-28.

Claim 18: See above with regard to claim 2.

Claims 1-2, 5-6, 17-20, and 37-40 are rejected under 35 U.S.C. 102(a) as being anticipated by Okamoto et al. (US 6437284, cited in July 25 2005 information disclosure statement).

Claim 37: Okamoto discloses the recited method at e.g. col. 4 lns. 50-65 and col. 6 ln. 3 – col. 7 ln. 12. Fig. 1A shows a laser oscillator 1. The laser beam is shaped into a linear shape through an optical system including an optical waveguide 33 (part of 30) and a cylindrical lens array (part of 40; col. 10 lns. 54-60), wherein the cylindrical lens array acts upon the linear beam spot in a direction of its minor axis (state shown in fig. 1D) and wherein the optical waveguide acts upon the linear beam spot in a direction of its major axis (state shown in fig. 1C). The major

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axis is parallel to the y-axis in figs. 1A-1D; the minor axis is parallel to the x-axis. See figs. 1A-1D, 4A-4B, and 7.

Claim 38: The waveguide 33 is a light pipe (col. 9 lns. 36-38).

Claim 39: The laser may be a YAG laser (col. 8 ln. 25).

Claim 40: The laser may be a YLF laser (col. 8 ln. 26).

Claims 1-2, 5-6, and 17-20: The limitations of these claims are met by the Okamoto system described above.

Claim Rejections - 35 USC § 103

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 2-4, 6-8, 14-16, 18, 20-22, 30, 32-36, 44, and 46-48 are rejected under 35 U.S.C. 103(a) as being unpatentable over Obara (JP 8-338962).

Claims 2, 6, 14, 18, 30, 44: Obara does not disclose the recited light pipes but rather teaches a pair of spaced mirrors. However, a light pipe is recognized in the art as performing an equivalent function. It would have been obvious to a skilled person to substitute light pipes for the mirror pairs in Obara because this would avoid the need to properly align the mirrors (since the reflecting surfaces of light pipes are in fixed relative positions). Furthermore, if the general system taught by Obara happens to be used for the same manufacturing process throughout its operating lifetime, there would be no need to have adjustable mirror pairs in this case and hence the system could be substantially simplified by using light pipes since they would not require means for adjustment.

Claims 3-4, 7-8, 15-16, 21-22, 33-34, 47-48: Each of these claims recites a specific range for the aspect ratio for the beam spot (at least 10 or at least 100). Although Obara does not disclose these particular ranges, they are considered arbitrary and not critical to the invention. A person of ordinary skill in the art would have understood that the appropriate aspect ratio depends on the proportions of the object to be illuminated and the processing conditions necessary for that product. Obara recognizes this fact and provides a means for adjusting the aspect ratio ([0005] and [0015]; fig. 1 elements 7 and 8). Furthermore, it has been held that the optimization of a result-effective variable is obvious absent evidence of criticality (MPEP 2144.05 II A-B). Obara suggests that the aspect ratio is an optimizable result-effective variable at least at p. 5 lines 1-3. Therefore it would have been obvious to a skilled person to determine an appropriate aspect ratio for the beam spot.

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Claims 20, 32, and 46: Obara discloses an excimer laser but not the other laser types listed in these claims. These are merely well-known alternatives and are not disclosed as critical to the invention. It would have been obvious to a skilled person to choose any type of laser so long as it is suitable for the annealing process described in Obara.

Claim 35: Obara discloses that the beam spot moves relative to the irradiated surface but does not specifically disclose a moving stage for moving the irradiated surface. It would have been obvious to a skilled person to have provided a moving stage for moving the irradiated surface since this would be simpler than moving the combination of the laser oscillator, its power supply or connections thereto, and the beam homogenizer (which itself includes a power supply and/or connections for the mirror pair drivers 7 and 8), and since it would eliminate the need for a separate beam-scanning element.

Claim 36: Obara does not disclose a transferring apparatus for transferring the irradiated surface to the moving stage. It has been held that automating a manual activity is obvious (MPEP 2144.04 III). It would have been obvious to a skilled person to provide a transferring apparatus since this would facilitate proper alignment of the irradiated surface with regard to the moving stage (and in turn, with regard to the beam spot) and thereby improve productivity.

Claims 3-4, 7-8, 21-22, and 41-42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Okamoto et al. (US 6437284).

Each of these claims recites a specific range for the aspect ratio for the beam spot (at least 10 or at least 100). Although Okamoto does not disclose these particular ranges, they are considered arbitrary and not critical to the invention. A person of ordinary skill in the art would

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have understood that the appropriate aspect ratio depends on the proportions of the object to be illuminated and the processing conditions necessary for that product. Accordingly it would have been obvious to a skilled person to determine a useful aspect ratio for the beam spot.

Allowable Subject Matter

Claims 9-12 and 23-28 are objected to based on the above informality objections to independent claims 9 and 23, but will be allowable pending an appropriate amendment to overcome those objections.

Claims 9 and 23 each require a second optical system which homogenizes the energy distribution along the minor axis of the linear beam spot and which includes a cylindrical lens array. The cited prior art references do not teach or suggest this feature in combination with all the other limitations of claims 9 or 23. Okamoto is regarded as being the closest reference. In one embodiment, its means 40 includes a plurality of cylindrical lenses which act to compress the beam along its minor axis as shown in fig. 1D. However, Okamoto teaches that the Gaussian energy distribution in the x-axis direction should be preserved in order to have a useful temperature gradient in the x direction (col. 7 ln. 13 – col. 8 ln. 7). Moreover, Okamoto was apparently aware of prior art systems which provided a uniform energy distribution in both the y and x directions, but indicates that the uniform distribution in the x direction was undesirable (col. 2 lns. 29-52) and thus teaches away from claims 9 and 23. Claims 10-12 and 24-28 are allowable by dependence from claims 9 and 23 respectively.

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Conclusion

The additional references listed on the attached PTO-892 form are considered relevant to the subject matter of this application.

Inquiries about this letter should be directed to Mike Stahl at 571-272-2360. Inquiries of a general or clerical nature (e.g., a request for a missing form or paper, etc.) should be directed to the technical support staff supervisor at 571-272-1626. Official correspondence which is eligible for submission by facsimile and which pertains to this application may be faxed to 571-273-8300. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Questions about the Private PAIR system should be directed to the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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February 7, 2006


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